C

2021/TDC/CBCS/ODD/
PHSSEC-301T/154

TDC (CBCS) Odd Semester Exam., 2021
held in March, 2022

PHYSICS

(3rd Semester)

Course No. : PHSSEC-301T

(Workshop Skill)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

Answer any *fifteen* from the following : 1×15=15

1. What is least count?

2. What is meant by instrumental error?

3. What is sextant?

C

4. What is backlash error?

5. What is workshop?

6. What is meant by machining?

7. What is forming?

8. Name two processes which are used in joining of metals.

9. What is tapping?

10. Name two important cutting tools.

11. What is filling?

12. What is meant by fitting?

13. What is meant by integrated circuit?

14. What is relay?

15. What is multimeter?

16. What is soldering?

17. Define mechanical advantage of a lever system.

18. What is moment of force?

19. What is gear?

20. What is pulley?

SECTION—B

Answer any *five* from the following : 2×5=10

21. Discuss how we can measure the thickness of a sheet by using screw gauge.

22. What are positive and negative errors of vernier calliper?

23. What are the defects of casting?

24. What is foundry? What are the different hand tools used in foundry?

25. Write a short note on bench vice.

26. What is milling machine?

27. Draw a neat block diagram of a regulated power supply.

28. Explain active and passive components of IC with examples.

C

29. Explain first kind of lever system. Give an example.

30. Briefly discuss the working of disc brake.

SECTION—C

Answer any *five* from the following : 5×5=25

31. Describe the principle of vernier scale. How can the length of a body be measured by using vernier scale? 3+2=5

32. How can the height of a building be measured with the help of sextant?

33. What is welding? Explain it. Discuss the advantages and disadvantages of welding joint. 3+2=5

34. What is timber? How can they be classified? Define exogenous and endogenous trees. 1+2+2=5

35. What is drilling machine? Discuss the working principle of drilling machine. What are the basic drilling operations? 1+2+2=5

36. What is lathe? Discuss the different lathe operations. 1+4=5

37. Discuss the working of a transistor as a switch.

38. Draw a neat diagram of CRO. Discuss the different components of the CRO and mention its uses. 2+2+1=5

39. What is hydraulic brake system? State its advantages and disadvantages. 3+2=5

40. What is power generating system? How can they be classified? 1+4=5

★★★

C

2021/TDC/CBCS/ODD/
PHSDSC/GE–301T/153

TDC (CBCS) Odd Semester Exam., 2021
held in March, 2022

PHYSICS

(3rd Semester)

Course No. : PHSDSC/GE–301T

(Thermal Physics and Statistical Mechanics)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

Answer any *fifteen* of the following as directed : 1×15=15

1. State zeroth law of thermodynamics.

2. What is the difference between heat and temperature?

3. State Carnot's theorem.

4. Name the thermodynamic process for which PV° = constant.

5. What are various thermodynamic potentials?

6. Define enthalpy.

7. What is a thermodynamic relation?

8. During free expansion, which thermodynamic function remains same?

9. The mean free path of a gas molecule depends on

(a) the number of molecules per unit volume

(b) the collision cross-section

(c) Both *(a)* and *(b)*

(d) collision frequency

(Choose the correct answer)

10. Blood is more viscous than water.

(Write True or False)

11. The viscosity of a fluid in motion is 1 poise. What will be its viscosity when it is at rest?

12. How much is the degrees of freedom of a triatomic gas?

13. The radiations emitted by hot bodies are called

(a) X-rays

(b) γ-radiation

(c) visible light

(d) blackbody radiation

(Choose the correct answer)

14. A blackbody is defined as a perfect absorber of radiations. It may or may not be a perfect emitter.

(Write True or False)

15. Name the scientist who first studied spectrum of blackbody radiation.

16. The distribution of energy of blackbody at a given temperature is

(a) uniform

(b) non-uniform

(c) straight line

(d) None of the above

(Choose the correct answer)

17. Define entropy.

18. Entropy of an isolated system can never

(a) increase

(b) decrease

(c) be zero

(d) None of the above

(Choose the correct answer)

19. Fermi-Dirac statistics can not be applied to photons.

(Write True or False)

20. If two parts A and B in a system are considered to be in equilibrium and having thermodynamic probabilities W_A and W_B respectively, then what will be the thermodynamic probability of the system?

SECTION—B

Answer any *five* of the following questions : 2×5=10

21. Prove that adiabats are steeper than isotherms using indicator diagram.

22. What is meant by thermodynamic process? How is it represented on an indicator diagram?

23. Briefly explain Joule-Thomson effect.

24. Write four Maxwell's equations.

25. On what factors does conduction depend on?

26. Write down the expression of viscous force and from that expression obtain the dimension of coefficient of viscosity.

27. Explain why a blackbody looks black.

28. Discuss Planck's hypothesis.

29. Distinguish between microstate and macrostate.

30. Distinguish between classical and quantum statistics.

SECTION—C

Answer any *five* of the following questions : 5×5=25

31. What is meant by the term internal energy of a system? Is it a state function? What is the difference between state function and path function? Give an example of each. 1+1+3=5

32. A gas at 10 atm pressure and 1 litre volume expands adiabatically to 2 atm and 3·16 litres volume. Calculate the amount of work done by the gas in joule. (Assume $\gamma = 1 \cdot 4$)

33. Prove Maxwell's thermodynamical relation

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$$

34. Deduce the relation

$$C_P - C_V = \left\{P + \left(\frac{\partial U}{\partial V}\right)_T\right\}\left(\frac{\partial V}{\partial T}\right)_P$$

where symbols have their usual meanings.

35. Derive Maxwell's velocity distribution formula for gas.

36. Show that $\eta = \frac{1}{3}\rho\bar{c}\lambda$, where η is the viscosity of a gas, ρ is the density, $\bar{c}$ is the mean molecular velocity and λ is the mean free path. What is the name of a fluid which does not have any viscosity? 4+1=5

37. Deduce Planck's radiation formula.

38. Deduce Wein's law and Rayleigh-Jeans law from Planck's formula. Draw the graph showing the comparison of Planck's law, Wein's law and Rayleigh-Jeans law. 2+3=5

39. Deduce Maxwell-Boltzmann distribution law.

40. Distinguish among MB, BE and FD statistics in detail.

★ ★ ★